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ABSTRACT

The EMERGENCE project carried out by the IES (Institute for Employment Studies) aimed to measure "eWork" at a global level. For the project, eWork was defined to mean any type of work that involves the digital processing of information and that uses a telecommunications link for receipt or delivery of the work to a remote employer or business client. Providing an overview for discussion, the project report first outlines the definition of eWork and then addresses the question of the value of monitoring eWork and points out its relevance to policymakers in many disciplines. Finally, the report discusses the inadequacy of the existing sectoral and occupational classification systems to capture the characteristics and dynamics of eWork, and suggests some issues for consideration by European agencies involved in the collection and analysis of statistics on the information economy. The report concludes with several recommendations, including the following: (1) European labor force surveys should include questions that make it possible to identify people who work at or from their homes or from multiple locations using computers with a telecommunications link to employers or clients; (2) the updating of occupational classification codes should include a process for capturing information on the new jobs that are emerging in the information economy and synchronizing codes throughout Europe; (3) methods for collecting information about earnings for such occupational groups should be developed; and (4) the data from such studies should be updated regularly through additional surveys. (KC)

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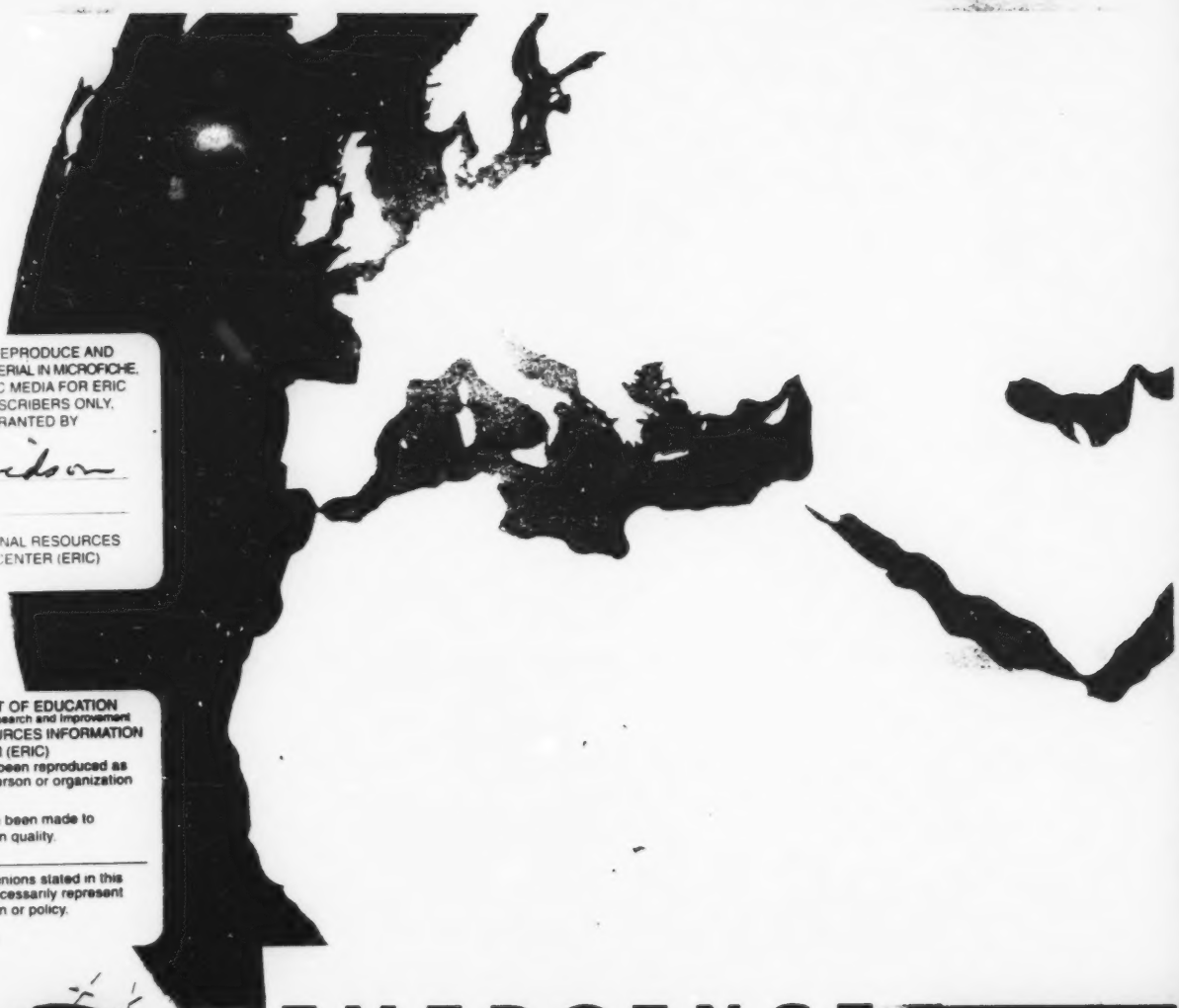
Statistical Indicators of eWork

U Huws



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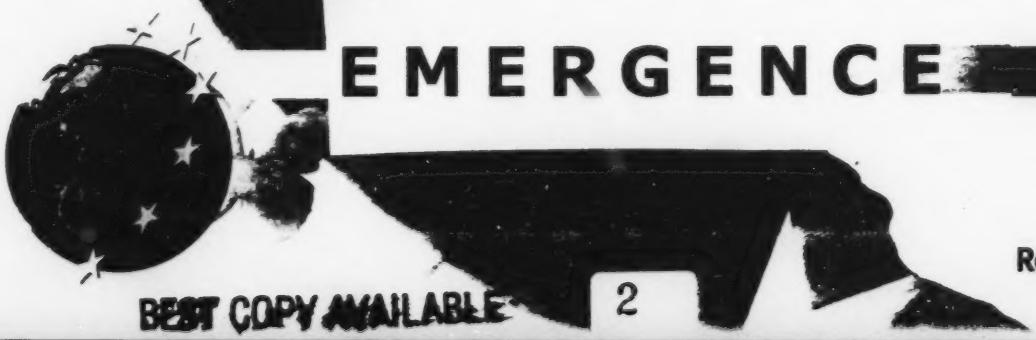

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A Discussion Paper

U Huws

EMERGENCE

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The Institute for Employment Studies

The Institute for Employment Studies is an independent, apolitical, international centre of research and consultancy in human resource issues. It works closely with employers in the manufacturing, service and public sectors, government departments, agencies, professional and employee bodies, and foundations. For over 30 years the Institute has been a focus of knowledge and practical experience in employment and training policy, the operation of labour markets and human resource planning and development. IES is a not-for-profit organisation which has a multidisciplinary staff of over 50. IES expertise is available to all organisations through research, consultancy, publications and the Internet.

IES aims to help bring about sustainable improvements in employment policy and human resource management. IES achieves this by increasing the understanding and improving the practice of key decision makers in policy bodies and employing organisations.

Executive Summary

This discussion paper arises from the EMERGENCE project, which, with core funding from the European Commission's Information Society Technologies Programme, aims to measure and map ICT-related employment relocation at a global level.

This paper draws on two earlier outputs from the project – a global review and analysis of existing literature and statistics and an 18-country survey of employers' use of eWork – to discuss the implications of the results for the identification and capture of statistical indicators of eWork.

The paper first outlines the EMERGENCE definition of eWork. It then addresses the question of the value of monitoring eWork and points out its relevance to policy-makers concerned with transport, the environment, housing and land-use, employment and training, social inclusion, trade and industry, taxation and development aid.

Finally, it discusses the inadequacy of the existing sectoral and occupational classification systems to capture the characteristics and dynamics of eWork, and suggests some issues for consideration by Eurostat, National Statistics Offices and other agencies involved in the collection and analysis of statistics on the information economy.

The report concludes with several recommendations:

1. European Labour Force surveys should include questions which make it possible to identify people who work at or from their homes or from multiple locations using computers with a telecommunications link to the employer or client.
2. Questions about the use of ICTs and the Internet should be asked of all respondents in Labour Force Surveys, regardless of employment status or location of work.
3. There should be a continuation of the process (already under way in some countries) of updating occupational classification codes in order to capture information on the new jobs which are emerging in the information economy, and a harmonisation of these codes at a European level.

4. In a parallel process, further work should be done on occupational profiling and benchmarking of professional qualifications relating to eWork.
5. There is a need to investigate means for collecting accurate and comparable information about earnings for each occupational group, either by means of additional questions in labour force surveys or from administrative records.
6. There is a need for ongoing research on the ways in which sectoral codes, particularly in the information services sector, can be adapted in order to reflect the changing structure of the economy and capture accurate information on the trade in ICT-based business services.
7. An EU-wide census of establishments should be carried out (using a common definition of 'establishment') repeated at ten-yearly intervals and regularly updated by means of sample surveys.

1. Introduction

The EMERGENCE project was established in 2000, with initial funding from the European Commission's Information Society Technologies (IST) Programme, with a range of objectives relating to the mapping and measuring of eWork at a global level.

In the first eighteen months of its three-year life, EMERGENCE carried out an analysis of the existing evidence which was available globally at a country level and within the EU at a regional level, in order to investigate what indicators are already available and what they can tell us about the extent and characteristics of eWork and the locations most likely to be involved. In parallel with this study, the project team also carried out a major international establishment-level survey of employers to collect more focused empirical evidence on these issues. The results of both of these studies have now been published by IES: the first under the title *Where the Butterfly Alights: the Global Location of eWork;* the second under the title *eWork in Europe: Results from the EMERGENCE 18-Country Survey.*

This discussion paper draws on the results of these two studies in order to explore the implications for the identification of indicators of eWork, and the collection and analysis of related statistics.

The paper is designed primarily as an input to discussion amongst professionals in national and international statistical agencies and policy-makers with an interest in the development of eWork. However, we hope that it may also be of interest to the broader research community and to employers' organisations, trade unions and other social actors involved in shaping the future of employment.

2. What is 'eWork'?

During the quarter-century or so since it was discovered that the combination of computing and telecommunications technologies could facilitate a relocation of white-collar employment away from its traditional office locations, an enormous range of terminology has been developed to describe some or all of the forms of delocalisation which have been made possible. These include 'telecommuting', 'flexi-place', 'telework', 'remote work', 'networking', 'digital nomadic work', 'electronic homeworking' and many variants of these. The term currently favoured by the European Commission and some other agencies is 'eWork'. Although this term does not specifically refer to distance (as do, for instance, the terms which are prefixed by 'tele-' or 'remote') it has the benefit of avoiding over-specificity and of being capable of being applied across a range of activities and not being restricted to a particular form of remote work, such as homeworking or mobile working.

We have adopted the term 'eWork' in the EMERGENCE project to refer generically to any type of work which involves the digital processing of information and which uses a telecommunications link for receipt or delivery of the work to a remote employer or business client.

It should be noted that the focus here is on the remote link with the employing body or business client. Such a definition does not include work which involves dealing with the general public by telephone or email (such as call centre work) unless this work also happens to involve the transmission of work over a telecommunications link to a remote employer or business client (*eg* an outsourced call centre, or a call centre located on a remote site but accessing a database at the employer's head office).

Because of the very widespread use of information and communications technologies across industries and occupations, such a definition covers an enormous range of employment, and there are very many different ways in which the broad category 'eWork' can be broken down. Once could, for instance, subdivide it by occupation, by skill or qualification, by the type of remote workplace involved, by industrial sector, by the type of employment contract used, by the number of hours worked, by the demographic characteristics of the workers (*eg* their age, sex,

ethnicity, marital status, disability *etc.*), by the degree of remoteness, flexibility or autonomy involved in the working arrangement, or by any one of a range of other variables.

The EMERGENCE conceptual framework was determined partly by the need to collect empirical data in a precise and unambiguous form which would allow for international comparability, and partly by the perceived information needs of policy-makers.

In essence, it involves the development of two complementary typologies which can be cross-tabulated against each other: a typology of forms of work delocalisation and a typology of delocalisable activities.

2.1 A typology of forms of work delocalisation

The conceptual framework developed for classifying the various different forms of delocalised work involves drawing two broad distinctions.

The first of these is a legal distinction: between work carried out internally (*ie* by people contracted to work directly for an organisation) and normally covered by a contract of employment, and work that is outsourced, and therefore normally carried out under a contract for the supply of services.

The second is a distinction between work carried out by groups of workers on shared premises (normally a building which could be described as an 'office') and that which is carried out by individuals acting in isolation away from 'office' premises. These people might be working from their homes (wholly or partially), or working nomadically from a variety of different locations, for all or part of the working week.

These variables are summarised in Figure 2.1. When combined, they provide us with a two-by-two cell matrix within which all forms of eWork so far identified by researchers can be grouped.

Figure 2.1: Typology of Work delocalisation

		Contractual	
		Internal/employees	**Outsourced**
Type of workplace	**Individualised (away from 'office' premises)**	Employed tele-homeworkers Mobile employees	Freelance teleworkers or mobile workers
	On shared 'office' premises	Remote back offices/call centres Employees working in telecottages or other third party premises	Specialist business service supply companies Outsourced call centres

Source: IES

These categories are necessarily somewhat rough and ready. There are both major differences within each category and overlaps between them.

It is useful, perhaps, to think of them not so much as discrete and stable categories of employment but as *choices* available to employers in how, and whence, they should obtain the various business services which they require. Should they develop their own internal source of supply using their own employees? If so, should they insist that these employees work at the establishment where the customer department is based? Or should they allow them to work elsewhere? Or would it be a better idea to set up a specialist back office at another location?

In the EMERGENCE employer survey, information was collected on each of these forms of working, *provided*:

- that it was remote: *ie* it took place at a geographical distance from the establishment which was surveyed; and
- that it was telemediated: *ie* that a telecommunications link was used to deliver the work.

Because of the considerable policy interest in the subject of call centres, in the survey an additional distinction was made between remote locations that were described as call centres and those that were not.

Combining these variables gave us in all nine different categories of eWork:

1. Fully home-based working by employees
2. Multi-locational or nomadic working by employees
3. Freelance work carried out away from the premises
4. Remote work carried out in remote 'in-house' (internally owned) back offices which are not call centres
5. Work by employees carried out in remote 'in-house' (internally owned) call centres
6. Work carried out by employees in telecottages or other remote third-party premises which are not call centres
7. Work carried out by employees in telecottages or other remote third-party premises which are call centres
8. Work outsourced to business service suppliers which are not call centres
9. Work outsourced to call centres.

Whilst all these forms are separately identified in the EMERGENCE survey results, and form mutually exclusive categories at any given point in time, it is recognised that it is entirely possible that an employer may use more than one of these

forms of eWork to carry out any given business function, or may switch from one to another over time. By the same token, an individual worker may also move over the course of a working lifetime between different forms of eWork.

2.2 A typology of delocalisable activities

Having identified the different ways in which work may be delocalised, we then categorised the kinds of activities involved in this delocalisation.

It was decided that for the purposes of the exploratory EMERGENCE employer survey the most stable and comparable, and therefore the most useful, unit of analysis was the generic business function.

The *occupation* was rejected as a defining category partly because of major international and sectoral differences in qualifications and occupational structure and in the internal division of labour within organisations, and partly because there are no categories in the official occupational classification systems for many of the 'new' occupations such as 'webmaster' or 'call centre worker'.

There were also major difficulties, which will be expanded on later in this report, in the use of sector codes as classification categories. We did, however, wish to record the sector of our respondent organisations as a separate variable in order to investigate the relationship between sector code and eWork. This precluded using it as a primary organising variable.

The generic business functions identified as relevant and used for data collection and analysis were:

1. Sales (telemarketing and mobile sales)
2. Customer service, including providing information, counselling and advice to the public or to business customers
3. Data processing, typing and other forms of data input
4. Creative or content-generating work including research and development, design, editorial work and multimedia production
5. Software development, maintenance and support
6. Accounting, debt collection and other financial services
7. General management, human resources management, and training.

Once again, some of these categories may appear overly inclusive, and there is indeed some degree of overlap between them. These functional types did, however, appear to correspond reasonably well with the departmental structures of the establishments

surveyed by EMERGENCE and to make sense to the interviewees in the survey. They must therefore be regarded, if not as ideal, at least as the least problematic unit of analysis available to researchers at the time.

When combined with the nine possible forms of eWork, these seven categories give us (at least in theory) sixty-three different possible forms of eWork which may be used by any given organisation.

3. What is the Point of Monitoring eWork?

In a world in which the use of ICTs is spreading rapidly into all areas of life, and being online is becoming the norm not just for businesses but also for individuals, at least in the more prosperous parts of the world, monitoring eWork seems not only extraordinarily difficult but also, perhaps, unnecessary. Faced with the difficulty of defining eWork many observers, understandably, might be tempted to ask: 'Why bother?'

The answer to this question may not be immediately obvious to a lay person. However, a study of the existing evidence[1] reveals extensive interest in these issues amongst a surprisingly broad range of social actors and indicates that eWork is relevant to many spheres of public policy.

3.1 Transport policy

Transportation issues are of central importance in any discussion of the broad social and economic implications of eWork. Indeed, the earliest literature on 'telecommuting' (much of it produced during the immediate aftermath of the '70s oil crisis) focuses almost exclusively on the opportunities it creates for substituting electronic communication for physical travel. Since these early studies, it has been recognised that the tradeoffs between telecommunications and physical forms of transportation are extremely complex, involving the mutual interactions of a large number of variables.

Despite these difficulties, those responsible for the design and implementation of transport policies require information on several aspects of eWork, including information on trends in home-based and mobile working (for instance the distances, routes and timing both of the commuting journeys which have been replaced and of the alternative forms of travel which have arisen in the context of eWork). There will also be a need to analyse the complex effects on travel patterns of the growth in 'eOutsourcing', resulting in a greater volume and complexity of inter-firm dealings.

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[1] Huws U, *Teleworking: an Overview of the Research*, Department of Trade and Industry, London, 1996.

Transport planning authorities also require information on the local and regional shifts in location of residences and workplaces which may have arisen as a result of eWork. In the longer term, large-scale forms of eWork (such as the development of remote back offices, or the practice of outsourcing to remote business service suppliers) may also result in significant changes in industrial location, especially (though not exclusively) in the location of service industries, and these changes may in turn have impacts both for travel-to-work and other work-related travel patterns and for the transport of goods. If they involve population shifts out of metropolitan areas (with their existing public transport infrastructure) into relatively undeveloped areas, then there may also be modal shifts from public to private transport.

3.2 Environmental policy

Closely related to these transportation issues are concerns relating to environmental policy. In particular, effects relating to volumes of traffic, mode of transport and duration of journeys have significant implications both for energy consumption and for pollution levels.

Policies aimed at establishing sustainability will depend crucially on accurate information about trends in eWork.

3.3 Housing, planning and land-use policy

The development of eWork also has major implications for housing, planning and land-use policy. Not only are there changes of use within localities (in particular, a blurring of the distinction between residential and non-residential use occurring as a result, on the one hand, of an increase in working from home and, on the other, of the conversion of former industrial premises to residential use); there are also shifts between regions as a consequence of the changing patterns of economic development resulting from the development of remote business services supply.

3.4 Employment and training policy

At national, regional and local levels there is a need to forecast employment levels and patterns of work in order to predict and cater for new training requirements and avert unemployment, underemployment and skill shortages.

In addition to information on the occupational, sectoral and geographical distribution of eWork, policy-makers in these fields also have an interest in other issues such as the employment status and working conditions of the eWorkforce, their demographic characteristics, their hours of work, their specific skill requirements and the management issues which arise in relation to the introduction and implementation of eWork.

3.5 Social inclusion policies

The development of eWork creates major new opportunities for the inclusion of formerly marginalised groups, including people with disabilities, carers and others who have in the past found it difficult or impossible to combine labour market participation with the temporal and spatial constraints of traditional office work. However eWork also creates new challenges and, without effective policy intervention, might also serve to exclude some groups, for instance those lacking the social, language or technical skills or the financial resources to access the new technologies, or those bypassed by the relevant infrastructure (such as people in remote rural areas). Indeed, it is sometimes argued that eWork may be instrumental in producing a 'digital divide' between those with, and those without such access.

In order to develop policies for inclusion, it is necessary for the relevant authorities to have access to reliable statistics on the demographic composition both of the 'eWorkforce' and of those excluded from it.

3.6 Trade and industry policy

The development of eWork has important long-term implications for trade policy and for the competitiveness of regional economies in the emerging global markets for services.

Accurate information about the supply and demand for these 'eServices' is important for a number of reasons:

- The technologies involved in eWork can form the basis of new industries and services.
- The introduction of eWork can improve the productivity and efficiency of existing enterprises, thus enabling them to compete more effectively on world markets and increase their market share.
- eWork can open up the possibility for new forms of distributed teamworking, collaboration, or synergistic 'tele-partnerships' within and between organisations, including small firms, enabling cost-efficient ways of pooling information which in turn make it possible for SMEs to compete effectively with much larger organisations.
- eWork can help to bring about a spatial redistribution of work, facilitating the relocation of work to economically deprived regions. Such developments have the dual effects of helping the enterprises concerned to keep their costs low, thus improving their competitiveness, and of creating employment in the areas where it is most needed.
- In the least developed regions, eWork opens up the possibility of diversifying local economies, creating alternatives to

agriculture and tourism which, because they are non-polluting, can co-exist harmoniously with these industries.

- In the de-industrialising regions, eWork provides a possibility for regeneration which is less capital-intensive (and therefore more accessible to local entrepreneurs) than the extractive and manufacturing industries which have traditionally provided employment to the local population, but which have often been externally owned and controlled.

Although there is a widespread belief among industrialists and policy-makers that such benefits will follow on from the introduction of eWork, many of these claims are currently in the realm of unsubstantiated assertions. Substantiation will only be possible with an improved statistical base.

3.7 Tax policy

If substantial amounts of employment are being relocated across national borders, or out of traditional workplaces, this raises knotty problems for those whose job it is to work out what taxes should be levied where, and which expenditure can be set against which income.

There has already been some public discussion about the situation in relation to the income tax of home-based teleworkers, which has in some countries, at least, occasionally been the subject of contradictory rulings by local tax authorities.[1] However, there has been little debate about other aspects of local taxation, such as whether or not homeworkers should be liable to pay local business taxes in countries where these apply.

Cross-border working raises more fundamental questions, some of which depend on the legal status of the relationship – whether, for instance, it is an employment relationship, a contract for the supply of services, or the purchase of knowledge-intensive product.

Without accurate information about the extent of these practices it is extremely difficult to develop appropriate policies and to work towards the international harmonisation which will undoubtedly be increasingly needed as eWork spreads.

3.8 Development aid policy

The introduction of eWork practices forms a strand in the sweeping changes which are currently restructuring the global

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[1] Huws U, O'Regan S, Honey S, *An Evaluation of Homeworking in ACAS*, ACAS Research Paper 2, Advisory, Conciliation and Arbitration Service, London, 1998.

economy and radically altering the relative positions of various countries within it.

In order to target their development aid programmes appropriately, it is helpful for the governments of more developed countries, and for the European Commission and other supra-national organisations, to have accurate and up-to-date information on the spread of eWork, the countries and regions which are effectively finding niches for themselves in the supply of services, and those which are in danger of becoming excluded.

4. eWork and Industrial Structure

One of the greatest challenges thrown up to the research community by the development of eWork is posed by the way it renders irrelevant, or at least extraordinarily difficult to apply, many of the classification systems which have traditionally been used to differentiate industries and product types.

Like any other aspects of human activity, economic processes are extraordinarily diverse and there is a sense in which any classification system will inevitably be somewhat arbitrary or imprecise. Nevertheless, in the past there has been some sort of consensus that there is a useful correspondence between the standard industrial classification systems which have been developed, and a relatively stable underlying reality. Although not entirely consistent, these systems have usually been rooted in a tripartite division of economies into 'primary' sectors (involving direct exploitation of the earth's animate and inanimate resources); 'secondary' sectors involving the manufacture of goods from these resources (subdivided firstly on the basis of the type of raw material used to manufacture these goods, *eg* 'metal-based manufacturing' and secondly, in more detail, on the basis of the type of product (*eg* 'office equipment'); and 'tertiary' sectors, providing 'services'. The classification of services has tended in the past to be less well developed. Some services have been defined in terms of their generic functions (*eg* 'retail trades'), some in relation to their ownership structure (with a separation of public and private services), whilst others have been grouped together in a 'miscellaneous' category with little internal coherence.

In the longer term, it is possible to discern secular shifts between activities carried out for exchange, outside the monetary economy, activities carried out within the service economy, the development of material products, and the development of new services which transform the boundaries between sectors.[1] Nevertheless, these

[1] In a process of commodification which is discussed by Ursula Huws in her 'Challenging Commodification', in *Very Nice Work If You Can Get It: The Socially Useful Production Debate*, Spokesman, Nottingham, 1985, 'Consuming Fashions', in *New Statesman & Society*, August 1988, 'What is a Green-Red Economics?: the Future of Work' in *Z*, September 1991, and 'Material World: the Myth of the Weightless

shifts can, at least in principle, take place whilst leaving intact the sectoral classification of individual firms and the division of labour between them.

In the past, periodic revisions have been felt to be sufficient to reflect any alterations which have taken place as a result of technological change or significant changes in ownership (such as large-scale privatisation). However, recently it has become increasingly apparent that a more fundamental rethink may be called for.

A number of factors have contributed to this:

- There has been a very rapid convergence between formerly disparate sectors, resulting in part from changes in technology. This can be illustrated by means of one example. Companies involved in the development of multimedia software may have evolved from parents formerly involved in computer manufacture (a sub-branch of metal-based manufacturing); publishing (a sub-branch of the printing sector which was traditionally in turn a sub-branch of 'other manufacturing'); toy-making (also historically classified under 'other manufacturing'); film distribution (classified as a miscellaneous service industry); broadcasting (because of its evolution from national public broadcasting authorities, often classified alongside other public sector services); software development (a sub-branch of 'business and financial services'); or telecommunications (generally classified alongside postal services, again for historical reasons) .
- The rapid transformation of products and services due to technological innovation renders it difficult to make comparisons over time, either qualitatively or quantitatively; it thus becomes impossible to monitor longitudinally the development of any given 'sector' with any degree of accuracy.
- Increasing cross-ownership resulting from the dominance of large, generally transnational, corporations with interests across a range of different sectors, – which already poses problems of classification – is complicated still further by mergers, demergers, investment and divestment.
- A growth in the scope and complexity of strategic alliances, public-private partnerships and other practices further blurs the boundaries between corporations.
- Corporations are fragmented by various forms of business process re-engineering, outsourcing, 'insourcing' or 'hollowing out'. The development of these increasingly elaborated and fast-changing patterns results in activities previously treated as internal overheads becoming reconstituted as separate cost-

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Economy' in Panitch L, Leys C (eds), 1999: *Global Capitalism vs. Democracy Socialist Register*, London and Toronto, 1999.

centres or profit-centres and, very often, externalised. However, the companies involved in supplying these external services may themselves be involved in similar processes of fragmentation, resulting in exceptionally complex inter-penetrating corporate networks.

- The continuously accelerating speed of change renders many of these developments provisional and transient.

When the EMERGENCE project was embarked upon, it was recognised from the outset that existing NACE sectoral codes would fail to capture the precise lineaments of the 'new' sectors which have grown up to supply business services. Nevertheless, it was assumed that there would be some correspondence between these activities and the codes which purport to describe them. We thought it likely, for instance, that most of the firms involved in supplying software would be coded as 'software consultancy and supply' or that many of those supplying data entry and typing services might be found under 'data processing'.

The results of the European employer survey[1] surprised even the most sceptical members of the EMERGENCE team. Not only do they illustrate the extent to which knowledge-based activities now permeate virtually every sector of the economy; they also cast doubt on the very concept of a 'sector' as a defining characteristic of firms likely to remain constant for long enough to be of use to researchers, and suggest that even the concept of the 'core' business of a firm is becoming outdated.

It is sometimes argued that the transition from an industrial to a service economy can only be completed if firms shift 'from selling services to selling experiences'.[2] In a world in which the 'brand' is all, it is common to find, for instance, cafes or book-bags sporting the logo of a cigarette company, clothing stores carrying the brand of a toy company, and anything from financial services to mobile phones to airlines carrying the name and trade mark that originated with a record store. Citing examples as various as Disneyworld, Niketown and British Airways, Pine and Gilmore propose a new model in which firms continually recreate their identities in a process which they summarise in the phrase 'you are what you charge for'.

The results of the EMERGENCE survey give some credence to such a picture. Whilst they by no means support a view of a situation where 'everyone does everything', they certainly demonstrate that the internal division of labour within some organisations is such that for many activities there is not only a

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1 Huws U, O'Regan S, *eWork in Europe: Results from the EMERGENCE 18-Country Survey*, Institute for Employment Studies, Brighton, 2001.

2 Pine II B J, Gilmore J H, 'Welcome to the Experience Economy', *Harvard Business Review*, July-August 1998, p 98.

choice between carrying them out internally or outsourcing them to an external supplier; there is also a third choice: to sell this formerly 'internal' (and 'non-core') service to another organisation. The global nature of markets and the increasingly generic nature of many business activities also seem to play a part in facilitating this process, thanks in part to the interoperability and standardisation resulting from using the same or similar hardware, networks, platforms and software.

As an illustration of this, in one case studied by the EMERGENCE project, a large power company found that it had surplus capacity in its internal call centre, because of large fluctuations in the workload. Instead of reducing staffing levels and using temporary or outsourced staff to cope with the peaks in demand (which might have been a feasible option) the company chose instead to capitalise on its human assets by selling the services of its call centre to other companies. At the time our study began, the company's call centre supplied its services to several other companies including a theatre ticket agency and a vehicle breakdown rescue service. Because they remained employed by the same company these call centre workers would nevertheless have been classified in the 'energy' sector. On a second visit to the company, a few weeks later, we found that it had restructured its services again, linking its various call centres into a virtual network and taking on a range of other activities, including dealing with customer loyalty schemes involving energy products for several supermarket chains and other service providers (including a major trade union organisation), selling electrical products over the phone and other activities relating to public safety. The same call centre worker might easily answer the telephone using nine or ten different corporate 'identities' during the course of a single shift, many of them in utterly different industrial sectors, whilst still retaining the 'core' identity of an employee of a power company. By the time of our third visit, the retail operation had been sold to another company and the portfolio of work handled by the call centre operatives had changed yet again.

When analysing the results of the EMERGENCE survey we found a vast range of sectors involved in the supply of business services to external business clients. At the four digit NACE level, there were 150 different sectors involved in the supply of customer services, 77 in the supply of telesales, 89 in the supply of data processing services, 109 in software supply, 102 supplying financial services, 94 selling management, training and HR functions, and 127 in supplying creative services. So incredible did we find these results at first sight that we selected a number of the most surprising cases and investigated them in depth, thinking that perhaps a question might have been misunderstood, or a response miscoded. In each case, however, we found a genuine case of an IT-based business service being sold to a business client using a telematic link for delivery. In one case, for instance, a

company which was coded as an 'instrument maker' was selling customer services to clients in other countries. Looking closer we found that the company had employees in a customer services department whose services it was selling to other manufacturers of similar products based in China, as well as in other European regions, thus both generating additional income and enhancing the 'customer experience' by offering a wider choice of products.

In fact the spread of sectors to which firms supplying customer services are coded is so broad that none accounts for more than seven per cent of the total. This is perhaps partly a result of the fact that the category 'customer service' does not exist in the current NACE classification scheme. Specialist customer service establishments (for instance outsourced call centres) therefore have no obvious 'home' in the scheme. It seems likely that many customer service providers are classified under the sector which forms their main client base; which, in some cases, may be the sector from which they evolved, or in which their parent company is based. A similar situation applies in relation to tele-sales. Amongst companies involved in providing tele-sales services to external customers, only one of the ten most frequently occurring sectors (non-specialised wholesale food and drink distribution) falls within the NACE sectoral classifications 51 and 52 which cover conventional retail and distribution activities.

No such excuse exists in the case of software development and support, however, for which two suitable codes already exist in NACE: 'software consultancy and supply' and 'other computer-related activities'. It is striking however, that although a number of companies supplying these services were indeed coded under these categories, these together accounted for only 24 per cent of cases. Three-quarters of firms supplying these services were therefore coded to other sectors. We must presume that in some cases (such as those coded under 'hospital activities', 'higher education' or 'central banking') the markets for their services must be sufficiently specialised to encourage suppliers to identify themselves solely with their customer base. In other cases, the establishments in question may be wholly or partially owned by parent companies in the sectors to which they are coded.

An even more surprising case is the data processing and typing function, for which a sectoral code exists in the NACE classification (number 7230, 'data processing'). Notwithstanding this, less than one per cent (0.38 per cent) of the establishments selling data processing or typing services in the survey were actually classified in this category.

Similar anomalies were to be found in the other business services investigated in the EMERGENCE survey.

The results of the survey provide an insight into the complexity of the supply of information services and the extent to which ICTs

are already being used to support their inflows and outflows both within and between organisations. Unfortunately, however, they also demonstrate the inadequacy of the existing classification schemes to capture information about these flows that would enable them to be monitored effectively in the future. They raise more general questions too about the ability of existing statistical frameworks to supply the raw material which will allow the information economy to be modelled, analysed and understood.

One of the most rigorous attempts to do this, carried out by the OECD in 2000,[1] based its analysis on the industrial classes of revision 3 of ISIC (the International Standard Industrial Classification). In addition to seven manufacturing categories (numbers 3000, 3130, 3210, 3220, 3230, 3312 and 3313) it included within its definition four service categories: 5150 ('wholesaling of machinery, equipment and supplies'); 7123 ('renting of office machinery and equipment, including computers'); 6420 ('telecommunications') and 72 ('computer and related activities'). Whilst providing enormously useful comparative information, it seems likely, in the light of the EMERGENCE results, that this exercise may have missed a great deal of economic activity directly related to the electronic processing and transmission of information. Conversely, it may well have included a range of activities which were not directly related to these processes.

The US Government has recently substantially altered its standard industrial classification (SIC) scheme and substituted a new version, NAICS, which captures some of these activities in rather more detail. The authors of the US Department of Congress's report on the emerging digital economy define 'Information Technology Industries' as a category made up of four subcategories: Hardware Industries (comprising 25 NAICS codes, replacing 19 SIC codes); Software/Services Industries (14 NAICS codes, replacing 11 SIC codes); Communications and Equipment Industries (5 NAICS codes replacing 3 SIC codes); and Communications Services Industries (12 NAICS codes replacing 3 SIC codes).[2] They freely admit, however, that no standard definition exists and that these codes correspond only approximately to those areas of the economy involved in the supply of IT or the processing of digital information.

Whilst any attempt to refine the classification of these industries is to be welcomed as an aid to analysis, the results of the EMERGENCE survey in Europe suggest that the concept of the sector (at least as presently defined) may be of limited value in monitoring future trends. This raises the question of what alternative approaches might be useful for classifying economic

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1 Pattinson B, *et al., Measuring the ICT Sector,* OECD, Paris, 2000.

2 Meares C A, Sargent Jr J F, *et al., The Emerging Digital Economy,* US Department of Congress Office of Technology Policy, June 1999, p. A1-19.

activity. This is a subject to which we will return in future reports from the EMERGENCE project and its sister project, STILE (see p.26).

5. The Unit of Industrial Analysis — Geographical or Legal?

The problems of industrial categorisation discussed in the last chapter arise particularly acutely in relation to the classification of enterprises – the most usual unit of industrial analysis. Because of requirements for companies (or other legal entities) to file their accounts or otherwise register their existence with the authorities, data sources based on the 'enterprise' are found more commonly than those based on the 'establishment' (the geographical unit of analysis). However, there are a number of problems with enterprise-based statistics when it comes to research on eWork.

Firstly, the number of enterprises in any given economy normally greatly exceeds the number of establishments – in the sense of physical premises where people work. Even allowing for sole traders working from their homes, one generally finds that some addresses apparently house large numbers of companies, many of which are not actively trading, and many of which have no employees.

Secondly, there are differences between countries in the definition of what constitutes an 'establishment' particularly hard to unravel where several different organisations occupy the same building, or where a single organisation is scattered across a number of buildings which are near each other, but not necessarily at the same address.

Thirdly, as already noted in the previous chapter, the disaggregation of enterprises, together with a growth in practices such as outsourcing and the development of strategic alliances, have made it increasingly difficult to disentangle the complex contractual relationships between firms and explore their relationship to particular geographical sites.

Where the location of work is the subject under study, it is of course necessary to collect accurate information on where each worker is based, so that the division of labour can be mapped geographically and the communication paths between each component unit can be tracked.

In order for this to take place, it is therefore necessary that the geographical location of the workers and the legal identity of their

employers are captured as independent variables, leading us to the conclusion that there is a need both for establishment data and enterprise data, together with some means of plotting the correspondences between them.

The unit of analysis in the EMERGENCE employer survey was the establishment (and more specifically, in the first phase, the establishment where at least 50 employees were working). The sample was stratified by country (to ensure representativeness in smaller countries) and sectorally. In attempting to weight the data to ensure that it was representative at the European level, we were considerably hampered by the lack of establishment-level data in several countries.

If eWork is to be tracked effectively in the EU in the future, it is our conclusion that a census of establishments should be carried out, perhaps decennially, supplemented by sample surveys at regular intervals in between full censuses (perhaps every two years). This would not only make it possible to collect reliable information on employers' use of eWork across the EU but would also be useful for many other purposes relating to planning, employment, training and environmental issues, to name but a few. Such an instrument would enable accurate longitudinal tracking of a range of variables but would also offer a vehicle for one-off supplements addressing issues of current concern to the Commission or to Member States. Provided that confidentiality requirements were met, the database could also offer a sampling frame for other surveys, including employer panel surveys, improving the representativeness of such instruments and making it possible to conduct research on a pan-European basis.

An establishment census would not obviate the need for enterprise-level data. On the contrary, it would provide a tool which would enable enterprise statistics to be analysed more meaningfully. Enterprise data, especially if it is classified by categories which enable the new ICT-based products and services to be identified accurately, will play a vital role in enabling us to analyse and understand the new patterns of outsourcing, especially cross-border trade in information services.

Once it has become possible to track the flows of information services between enterprises and map these geographically, it will be possible to construct input-output tables which capture these flows as accurately as inter-sectoral and international flows of physical commodities are already tracked in the national accounts of some countries, such as the UK. This will make it possible, for the first time, to trace the lineaments of the 'knowledge economy' by following flows of 'knowledge' as they permeate the economy from sector to sector, and calculate the value which is added at each stage.

6. eWork and Occupational Structure

The convergence and reconstitution of traditional industrial sectors is mirrored by a transformation of traditional occupational profiles.

In the past, very many (though not all) occupations were defined by reference to the tools or technologies used by the workers concerned. Such occupations included categories like 'lathe operator', 'pattern-cutter', 'typesetter', 'key-punch operator' or 'telephone switchboard operator', to name but a few. With the advent of information and communications technologies, much of the machinery which gave these workers their distinctive skills and identities became obsolete, replaced by a single generic (though rapidly evolving) new technology: the telecommunications-linked computer. To continue to define workers by the tools they use would be to consign a very high proportion of the workforce, perhaps even a majority in some countries, to a single category of ICT-worker.

It is clear that a much higher degree of differentiation is required if meaningful statistics are to be collected on the composition of the workforce, and it seems likely that it will be necessary to use an alternative basis for classification, perhaps using variables relating to the job function, the qualifications required to perform it, the sector in which it is carried out or some combination of these.

Nevertheless, it is important not to lose sight of the fact that the use of these generic technologies does give these very disparate labour processes an important common feature: to the extent that the work can be carried out solely with the use of these technologies, it carries the potential for delocalisation. It is, in other words, either actually or potentially eWork, unless it contains additional elements which root it in a given geographical spot, because, for instance, the job involves the production of 'real' material goods, or the physical delivery of 'real' services to 'real' people in 'real' time or 'real' space.

Preliminary work on Eurostat occupational data carried out at the European regional level by the EMERGENCE project[1] indicates

[1] Huws U, Jagger N, *Where the Butterfly Alights: the Global Location of eWork*, Institute for Employment Studies, Brighton, 2001.

that currently available statistical categories (*ie* those used in ISCO, the International Standard Classification of Occupations) are not adequate for identifying eWorkers.

At one extreme are three highly specific occupational categories referring to technical occupations directly connected with the development or maintenance of IT: Computing professionals (ISCO 213); Computer associate professionals (ISCO 312); and Optical and electronic equipment operators (ISCO 313). Some further differentiation is possible within these categories, for instance ISCO 312 includes Computer assistants (ISCO 3121), Computer equipment operators (ISCO 3122) and Industrial robot controllers (3123). However, this does not help us to identify workers who use generic IT tools but whose current job designation does not refer to them.

At the other extreme are a wide range of broadly defined occupations which have been identified in population surveys as being involved in home-based or mobile teleworking, from which it can be inferred that they are at least potential eWork occupations.

The EMERGENCE study used the UK Labour Force Survey (which is unusual in including questions which make it possible for teleworkers to be identified) to identify such occupations.

We defined as a 'home-based teleworking occupation' any occupation in which more than ten per cent of all those in the occupation reported that they spent at least a full day in the reference week working at home using a computer with a telecommunications link to the employer or client. It should be noted that only those occupations where the numbers teleworking were statistically significant were included. This meant that some occupations with small numbers, but high levels of reported teleworking were excluded. The resulting analysis found a wide range of occupations involved in telework, with nine of the 28 occupational categories classified as 'managerial', eight as 'professional', and a further nine classified as 'associate professional'.

In a similar exercise, 'multilocational teleworking occupations' were derived from an analysis of the occupations of respondents to the Labour Force Survey who reported that they worked from multiple locations using home as a base and using a computer and a telecommunications link to the employer or client to perform the work. The ISCO occupational categories which emerged as a result of this process indicated that, when compared with home-based teleworkers, mobile teleworkers are more likely to be associate professionals, with half the occupations falling into this category. The remainder was largely accounted for by managerial and professional occupations, with two out of ten occupations in each of these categories.

Whilst revealing the very broad spread of eWork across existing occupational classifications, this exercise demonstrated that these categories are too all-embracing to be useful in themselves as indicators of eWork, and that there is a need for greater differentiation.

As well as obliterating many of the distinctions between traditional skill-based occupational categories, the widespread introduction of ICTs has also brought into being new occupational categories, such as 'call centre operator', 'webmaster' or 'network engineer'. Any revision or refinement of existing occupational categories will also have to be capable of identifying these.

The challenge to the data collection and research community is this: how can we define occupations in such a way that accurate data are produced which can inform training providers and all actors involved in the labour market on both the supply and demand side, whilst still retaining sufficient information on technology use to monitor changes in the location of work? This challenge is rendered even more difficult by major differences in national qualifications systems and nomenclatures.

This task would appear by no means impossible, however. The first stage in such an exercise (which is already under way in some countries) involves the development of standardised and replicable procedures for occupational profiling which might (at least initially) take different forms in different countries. However, it would seem entirely possible, at least at the EU level, to pool the results of research in different member states in order to inform a discussion leading to an agreement on a common scheme. The aim would be to refine the ISCO classification to produce a much more differentiated set of codes for workers in the information economy.

This would be useful for a variety of different policy purposes, including benchmarking national qualifications, encouraging labour mobility, anticipating skills shortages, and the development of training, employment and regional development policies.

Closely related to the classification of occupations is the codification and benchmarking of qualifications. Considerable progress has already been made within the EU in benchmarking occupational qualifications in the interests of promoting labour mobility and the transferability of skills. As new occupational definitions emerge, it would be helpful if this process could be accompanied by a codification of the relevant national qualifications relating to information technology employment or eWork. This would make it possible to generate genuinely comparable information about the skills of the workforce at a regional level. This would not only be of great use to researchers and policy-makers but would also be an aid to employers or investors searching for locations for new information economy activities.

In the collection of data on occupational structure, it might be helpful to capture as independent variables two sorts of information – information on professional qualifications and information on use of technology – in such a way that they can be cross-tabulated, thus making it possible to track the changing relationship between generic skills and occupation-specific knowledge. The experience of the UK Labour Force Survey, in which people who work at or from their homes are already asked about ICT use, suggests that it would be perfectly feasible to ask all workers, regardless of where they are based, whether they use a computer with a telecommunications link in order to do their work, and, in addition, perhaps, whether their work involves use of the Internet.

7. Population Censuses and Labour Force Surveys

The most useful tools for capturing the detailed characteristics of the workforce are the periodic population censuses and more frequent labour force surveys carried out in all European countries.

These make it possible to identify with some precision the attributes of individual workers (or potential workers) and those characteristics of their jobs which are likely to be known to the individual. A respondent in such a survey will know, for instance, his or her own qualifications, job description, place of work, hours of work, technology used, household situation and other personal characteristics such as age, sex or disability. Such surveys are therefore useful tools for capturing information on what might be called 'individualised' forms of eWork, involving working from home or working from multiple locations.

The individuals questioned in population surveys cannot, however, be relied on to give accurate information about issues which may not concern them directly, for instance: the parent company of the organisation for which they work; whether or not their employer outsources to other organisations or is involved in strategic alliances with them; whether the work has been relocated from another site; what kind of technology is used to deliver it to remote clients or whether similar work is carried out by other workers on other sites. The answers to such questions have to be obtained by other means, such as employer surveys, analyses of company accounts, or censuses of buildings and land use.

Population censuses and labour force surveys therefore provide only partial information on eWork, but such information is nevertheless of considerable value. The inclusion of questions in the UK labour force survey which make it possible to identify home-based and multi-locational teleworkers has proved to be a cost-effective way of producing robust information, annually updated, on the growth of these forms of work and the characteristics of the workers involved. One feature of the approach adopted is the collection of information on the use of computers and telecommunications links as distinct variables, independent of information about occupation and place of work. This makes it possible to cross-tabulate these variables, and study the relationship between occupations and technology. As already

noted, this approach could easily be extended to the entire sample, regardless of the location of employment.

The inclusion of such questions in other national labour force surveys, and hence in the European Labour Force Survey (especially when combined with revised sectoral and occupational codes as proposed above) would offer an exceptionally powerful means for monitoring the development of individualised forms of eWork and studying the characteristics of the emerging eWorkforce.

The STILE[1] project will be focussing in greater detail on how this might best be achieved.

Finally, for the purposes of comparing regional and national labour markets and modelling their comparative advantages, it would also be extremely useful if labour force surveys collected accurate information on income.

We are aware that there are many arguments against including questions about earnings in surveys. Respondents are often reluctant to answer questions about their incomes and, even when they do so, do not necessarily give accurate replies. In countries where such questions are included (*eg* Belgium and the UK) they are generally optional, with respondents having the right not to reply. This means that the results are often partial and difficult to interpret.

A further objection to using wage data from labour force surveys and to make international comparisons is the very differing structure of national tax and benefit systems, which mean that take-home pay is not a good indicator for net individual or household income. Fortunately, this problem has been solved by the development of the EUROMOD European Tax-Benefit Model at the Microsimulation Unit of Cambridge University's Department of Economics. This model makes it possible to model these differences with considerable accuracy, but of course requires good income data to be truly effective.

In our view, it would be useful to investigate the feasibility of including questions on income in the European Labour Force Survey. Failing this, administrative records, such as those based on National Insurance records which form the basis of the annual *New Earnings Survey* in the UK, might provide an alternative source of income data. In order to be useful for our purposes, however, they would have to use occupational categories which would allow them to be triangulated with data from labour force

[1] STILE stands for Statistical Indicators on the Labour market in the E-economy. This project, funded under the European Commission's IST programme, will be launched in the Autumn of 2001, under the leadership of the Hoger Instituut voor de Arbeid (HIVA), based at the Catholic University of Leuven (Louvain) in Belgium.

surveys and population censuses with some degree of accuracy. It would also be necessary to achieve a considerable degree of harmonisation at the European level to allow international comparisons to be made. This too is an issue which will be investigated further by the STILE project.

8. Other Statistics

The development of eWork does not just create challenges for researchers attempting to characterise the workforce; it also generates new problems in other areas of statistical collection and economic analysis.

The results of EMERGENCE's work do not shed such direct light on these; however, we conclude with a brief summary of three issues which seem particularly important to us.

8.1 Productivity data

As has been pointed out by Norbert Walter,[1] the increasing flexibilisation of work in the information economy, with its blurring of the boundaries between work and leisure, combined with the multi-purpose nature of IT, make it extremely difficult to keep accurate track of investment levels and working hours – in other words the inputs of capital and labour. This in turn causes problems for the calculation of productivity levels and value added.

8.2 Trade data and the national accounts

Most of the systems currently used for tracking imports and exports were designed to capture flows of material goods which are physically transported across borders. 'Invisible' imports and exports were traditionally regarded as simple flows of money, whether this took the form of rents, debt repayments, dividends, the purchase of shares or some other purely financial transaction. These systems are rather poorly adapted for measuring flows of information delivered electronically over the Internet, as witnessed by the OECD's research on international trade in software[2] which showed enormous variations in the estimation of the scale of this trade, depending on the sources and methods used to calculate it.

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1 Walter N, 'The New Economy questions traditional concepts', *CEIS decennial conference*, Sigma 2, 2001.

2 Working Party on the Information Economy, *Measuring Electronic Commerce: International Trade in Software*, OECD, Paris, April 30, 1998.

Improved sectoral classification, as discussed above, might make a useful contribution to the development of categories which could be used to introduce greater clarity and consistency into the statistics used for drawing up national accounts and the presentation of trade statistics.

8.3 Research on the relationship between existing indicators and the new economy

This paper has focused on refinements to or further developments of existing classification systems, data gathering instruments or procedures. There is also a need to identify entirely new indicators which are not captured by the existing instruments.

One means of doing so is the development of hypotheses which can be tested in pilot studies. A productive way forward here might involve triangular forms of collaboration between the European Commission or other international bodies; together with national statistics offices; together with academic or professional researchers. In this way, such pilot studies could be developed in ways which experimentally test the collection of new variables, or try out new methods of collection, whilst remaining compatible, and therefore comparable, with existing research instruments and methods.

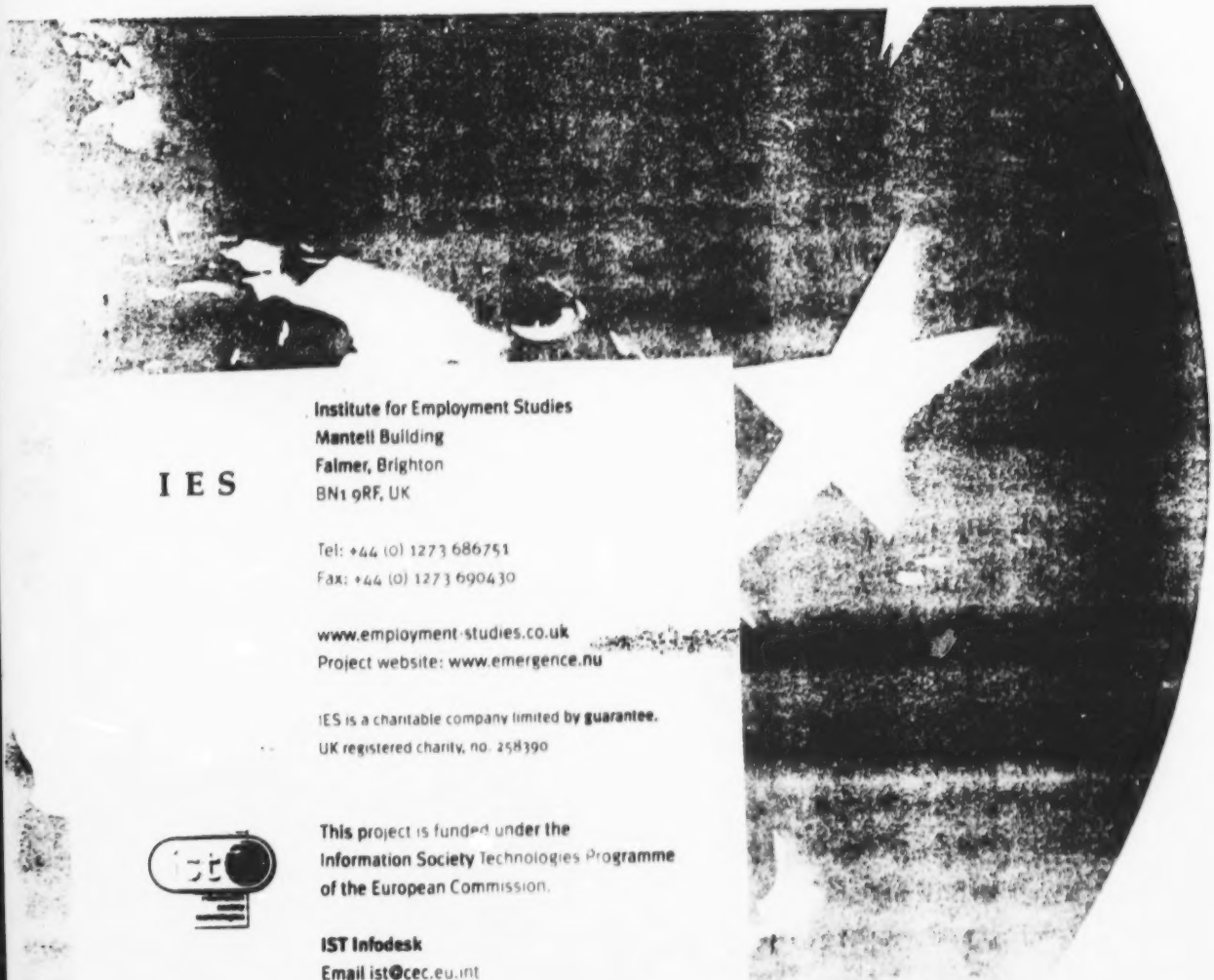
Again, we hope that the work of the STILE project, which commenced in the Autumn of 2001, will develop specifications for some such studies.

9. Summary of Recommendations

1. European Labour Force surveys should include questions which make it possible to identify people who work at or from their homes or from multiple locations using computers with a telecommunications link to the employer or client.
2. Questions about the use of ICTs and the Internet should be asked of all respondents in Labour Force Surveys, regardless of employment status or location of work.
3. There should be a continuation of the process (already under way in some countries) of updating occupational classification codes in order to capture information on the new jobs which are emerging in the information economy and a harmonisation of these codes at a European level.
4. In a parallel process, further work should be done on occupational profiling and benchmarking of professional qualifications relating to eWork.
5. There is a need to investigate means for collecting accurate and comparable information about earnings for each occupational group, either by means of additional questions in labour force surveys, or from administrative records.
6. There is a need for ongoing research on the ways in which sectoral codes, particularly in the information services sector, can be adapted in order to reflect the changing structure of the economy and capture accurate information on the trade in ICT-based business services.
7. An EU-wide census of establishments should be carried out (using a common definition of 'establishment') repeated at ten-yearly intervals and regularly updated by means of sample surveys.

This discussion paper arises from the EMERGENCE project, which, with core funding from the European Commission's Information Society Technologies Programme, aims to measure and map ICT-related employment relocation at a global level. It discusses the value and relevance of monitoring eWork, and the difficulties with existing classification systems.

It draws on two earlier outputs from the project (a global review and analysis of existing literature and statistics, and an 18-country survey of employers' use of eWork) to discuss the implications of the results for the identification and capture of statistical indicators of eWork. The paper makes recommendations for future collection and analysis of statistics on the information economy.



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